

Better Homes and Centers



Michigan Department of
Social Services

Science: Part I

Issue 18 Fall 1988

SCIENCE? OR SIMPLY A CHILD'S REAL WORLD?

By Sally Fee

Early Childhood Consultant

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Detroit

Many child care providers and parents confess a weakness when it comes to the part science plays in the lives of young children. Yet when I visit classrooms and centers, I find many wonderful activities and involvement brimming with the fundamentals of good basic science. Could it be that we are still intimidated by the experiments and studies that confused us as elementary and high school students?

Perhaps we need a better understanding of how children learn in order to promote scientific skills that will enrich their lives forever. The preschool child is quite perception-bound. He can mentally grasp something only as it appears. Therefore, it is pointless to expect the preschooler to digest the concept that sunlight passing through a prism produces color because of the varied lengths of rays. To the child, it appears as unexplained magic.

Magic is intended to trick us and be forever unexplained. Science is not sleight of hand... yet may often appear mysterious. We will never know it all — but mystery is what keeps us going and reaching. The mystery is just waiting to be explored and understood through developmentally appropriate experiences in the child's real world.

In the child's real world, however, countless opportunities exist to provide an enriched laboratory for learning. Caregivers must be armed with their own adequate supply of enthusiasm and genuine curiosity about the world. As role models, they can then instill and support these same attitudes in children as they explore with them and rejoice in their discoveries.

Several components provide a user-friendly scientific environment:

Observation Skills

Encourage children to become good noticers. Get them to seek and find, explore and examine, classify and sort, compare and contrast.

Language Skills

Promote familiarity with descriptive vocabulary so

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DIRECTOR'S CORNER

In the upcoming year, the Division anticipates implementing a major change with the Department computer system that serves day care. This change will result in an expanded data base which combines all DSS licensing programs and links them directly to other data bases in the Department.

While the new system is being designed primarily to assist Division staff in monitoring their work, I would like to share with you some of the ways it may directly affect you when it is turned on.

1. Each regulated home and center will receive a new license/certificate and number issued by the computer. Your current numbers will no longer be valid at that time.

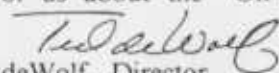
You will receive two mailings. The first will be sent approximately one month before the new license/certificate and number are issued.

The second will enclose the new license/certificate showing your new number and ask you to destroy your old license.

We have been working closely with the Department of Education Food Program and DSS Day Care Payments staff so they are ready for the change also. We are hoping for a smooth transition which will not delay any payments you may be getting from these two programs.

2. If you misplace your license, we will be able to issue a duplicate more quickly.
3. For the first time we will have a way to track on the computer all unlicensed homes and centers that come to our attention.
4. When your license or registration is renewed, you should receive it sooner since most consultants will have a microcomputer linked to the Department computer in Lansing.
5. Directory listings or mailing labels of centers and homes, will be easily accessible.

We are excited about the upcoming change! We believe it will allow us to serve you better, while at the same time helping to monitor and track our work responsibilities more accurately. As the months ahead approach, you may be hearing more about our new system and the planning steps in which we are involved. If you have questions, please feel free to ask any of us about the "On-Line" system.


Ted deWolf, Director
Division of Child Day Care Licensing

SCIENCE . . .

(Continued from page 1)

that children can tell about things they have discovered.

Relationships With Real Objects

Let children use all five senses to begin to understand their world. This means field trips and visitors, not just pictures in books; participation instead of watching demonstrations. It means children acting on the environment in order to construct their knowledge.

Attitude

Promote the freedom of curiosity — to fail without disgrace as well as to succeed; to guess or hypothesize without fear of being wrong.

Resources

Provide equipment to assist examination and exploration: magnifying glasses, balance scales, magnets, cages. Provide various sources for information. Adults do not know all the answers and answers change as we learn more. Resources may include people, books, and additional firsthand experiences.

Wonder

Above all, foster the deep appreciation, the awe of the natural succession of events . . . the incredible miracles of roots that go down and sprouts that reach up, baby animals, icicles from leaking gutters, and balls that bounce as well as the greater events as witnessed in thunderstorms, seasonal changes, geographical contrasts, and man-developed building construction.

We must learn to listen more carefully to children. If we are doing all the talking, how can we know what the children know . . . and what is more important, why they think so and how they found out. Our questions must be more open-ended: "Can you tell me how you sorted those?" instead of "What color is that?"

We must recognize that science is happening every minute of the day — in all of the outdoors and in every part of the center and home — not just between 9:00 and 10:00 a.m. during free choice time at a table next to the window. That is not to say that a Science or Exploring Table is inappropriate, as long as we don't promote the notion that this is the only place science is happening. Just think of the scientific concepts learned as the children spread blue and yellow fingerpaint across the paper, build towers with varied lengths of blocks, compare the sounds of keyboard and autoharp, explore water with funnels and sponges, cook vegetable soup from scratch, and visit the farm.

These first hand experience, the relationships with real objects and actions give our young children the best possible foundation on which to build a sense of security. In the child's real world, security does not evolve from magic.

SCIENCE CENTER: A Place to Find Out "Why"

By Carole Grates
Licensing Consultant, Saginaw

Can you "teach" science? Of course you can! Grace Mitchell says, "You can and will become an expert on *exploring* and *explaining* the world around you. There is one rule of self-training in science to follow: Always ask WHY?" To help children in your care to ask "why," try setting up a science center.

Select an area of the room that has natural light. Place one or two tables in the area that will be large enough to display science tools as well as collections and experiments. Be sure to leave a work space for two or three children to conduct their own experiments and to record their conclusions. Better yet would be some low shelves and a table for a work surface and collections. The tools could be stored on the shelves that have been labelled for easy identification.

Provide as many of the following items as you can afford:

| | |
|--------------|-------------------------|
| hand mirrors | weighing scales |
| magnifiers | balance scales |
| prisms | tape measures or rulers |
| magnets | string |
| thermometers | flashlights |
| stethoscope | microscope with slides |
| binoculars | |

The table or shelf surfaces should be large enough to display several types of plants, a bug box, a fish aquarium and animal cages (if you wish to care for critters). You will also need space for ongoing collections (shells, rocks) and seasonal collections (leaves, seeds).

Provide some picture reference books on nature and physical science. Have empty containers for sorting and classifying. And finally, set out writing or drawing materials to record observations, predictions, conclusions or directions on conducting any one experiment. As the year progresses, you will have a book to publish.

Remember, the science center is an enhancement of the whole "scientific" environment. The tools are there to be used wherever a discovery is made and should not be restricted to the science area.

Science is an ongoing process of answering the "whys" of the world. This process of observation, experimentation and analysis happens everywhere in the early childhood setting. A science center is meant to enhance children's discovery of their world by making the tools for observation, experimentation and communication available.

PROBLEM SOLVING: TEACHING THE PROCESS INSTEAD OF THE ANSWER

*By Kit Payne, Head Teacher
Child Development Laboratories
Family & Child Sciences
Michigan State University*

Three-year-old Kelly stands at the sand table, scooping sand into a funnel, then watching it pile up and cascade down as the funnel is lifted above the surface of the sand. Kelly shovels up another load of sand and carefully lets it run over the edge of the table and onto the floor...

Mr. Scubic, from his chair beside the sand table, realizes what's happening a little too late to stop it. He has several options from which to choose as he responds to Kelly's "experiment." Let's consider a few of them and the kinds of messages they carry.

- "Kelly! There's sand all over the floor! If you can't keep it in the table, then choose another place to play," Mr. Scubic says, as he grabs a broom and begins sweeping the sand into a pile.
- "Kelly, watch what you're doing! Robin and Jamie — don't step there — you'll track sand all over. Move back so I can clean this up."
- "You decided to hold your funnel right over the edge! I'm concerned that the sand will make slippery spots on the floor. Think of a way to move that sand to a safer place."

Herein lies the crucial difference that stimulates Kelly to use critical thinking: in the first two scenarios, the adult has solved the problem. The third response asks the child to solve it.

Answering questions and solving problems rate right near the top when those who care for children evaluate the types of interactions they have with their young charges. To serve them well over a lifetime of encounters with an increasingly complex world, however, we would do well to teach them skills with which they can arrive at their own answers and solutions.

The process of thinking critically has been broken down into a series of steps and used for many decades by those who propose theories and carry out experiments in every discipline of study. These same steps can be taught to young children, both in everyday situations like the one described above and through planned experiences with familiar preschool materials. Here are the steps of the Scientific Process, with suggestions for an adult "script" that leads children to use them:

- Hypothesize about objects that will sink or float in the water table or bathtub.
- Set up balance scales. Predict which sets of objects will weigh more or less than each other.
- Investigate magnets: what will they attract? Why?
- Experiment with ways to remove nails from blocks of wood at the workbench.
- Test various methods for removing objects from small-mouthed bottles.
- Guess and test out the number of inch cubes that can be fitted into covered containers of various sizes.
- Try several methods for wiping up spilled juice. Introduce the idea of wringing out the sponge periodically. Discuss reasons why this changes the amount of effort required to soak up all the juice.

Don't be concerned with teaching the "one right answer" to problems and experiments! Teaching the process of arriving at solutions is well worth the investment in time and talk that it takes.



TEACHING SCIENCE . . .

Opening the Door to a World of Nature Discovery

By Steven Buchinger
1st and 2nd grade teacher
Good Shepherd Lutheran School
Saginaw

Teaching science successfully in early childhood classrooms does not require you to be an expert in the field of science. It is not what you know, but what you discover and learn along with your children that is important. It is your responsibility to communicate the excitement of science to help develop positive attitudes toward that subject. A renewed emphasis on education in science is occurring and you can do your part to boost scientific competence in our country by opening the door even at the early preschool age.

The challenge is to provide experiences that will help children to get in touch with their world. By finding and using resources you can provide opportunities for science experiences. These science activities do not have to be onetime experiments but rather they could be integrated into your existing curriculum. The early childhood educator can integrate outdoor educational experiences to complement the curriculum, allowing children to discover concepts in nature.

We depend on the natural environment and we need to provide experiences and education outdoors that will develop children's attitudes as caretakers of this world. Children are a part of nature and they need nature around them. The outdoor environment can be a place for many learning experiences using natural learning devices. Building on the innate curiosity that children have about their world, they can grow in knowledge as they are developmentally ready.

Children can explore scientific concepts in the following variety of ways:

- A toilet paper spyglass helps to limit the scope of the eye because looking through a cylinder causes children to focus on the specific.
- Magnifying glasses can be provided to explore classrooms.
- Construction paper viewfinders can help to get the focus off of the whole scene.
- Leaf slides direct children's attention to details that may otherwise be missed.

snowflake catcher



leaf slide

viewfinder



- Catch those first snowflakes of the season on a snowflake catcher.
- Build bird nests using found materials from outside and pretend that you are a bird.
- Blow milkweed seeds around the classroom and let the wind do it when you are outside.
- Water a sample of soil or a chunk of sod after bringing it inside to see what will grow out of it.
- Do a plot study of one square foot of ground by counting the plants and insects that it contains.
- Melt a jar of snow to see how much dirt it contains.
- Put a chunk of ice into a mitten and one on the shelf to see if the mitten insulates.
- Sprinkle tempera on paper and paint with ice as your brush.
- Measure a snowbank.
- Paint in the snow using squeeze bottles filled with paint or practice your letters and numbers.
- Record rainfall in containers.
- Find the coldest spot outside and the warmest spot.
- Collect pigments from natural objects using sandpaper.
- Use dandelions to teach sequence — unopened, opened, closed, and gone to seed. Students could put them in order.
- Make a worm farm with an aquarium covered in black paper; check their activity.
- Choose a tree friend to be your "bark buddy" all year long. Record seasonal changes. Draw the tree in all four seasons. Do leaf prints, bark rubbings, twig drawings, etc. Study the buds and force some by bringing them into the classroom early in the spring. Hug your tree. Drill a hole in it to see if sap comes out. Measure your tree.

Provide resources that would emphasize learning by doing and give children experiences that they will remember. Don't forget to discuss your discoveries, letting the children process their learnings by sharing ideas with each other. Create record books to help children involve their parents. Object graphs can organize the natural treasures that are brought into the classroom. Dramatic play or movement exploration can further enhance your outdoor learnings as you bring them indoors (seeds growing, wind blowing a tree).

You may be able to provide a child's first hands-on experience with the good earth. You can help children to find a place to watch and learn the natural cycle of things — lessons that will last a lifetime.

SOME "AROUND THE SCHOOL YARD" ACTIVITIES

Submitted By Steven Buchinger

General Instructions

Equipment needed for activities described below:

- 1 sheet of drawing paper (8½" × 11") per child.
- Each child brings one dark crayon (green, black, brown, etc.)
- Each adult leader should have a clipboard and paper and pencil.

List as many of the children's comments as possible for each activity.

Tell the children you are writing down their descriptions.

At intervals through the activity, read their comments back to them.

At the end of each activity, read what was said as a summary.

A. Sound Hike (10-15 minutes)

1. Take the children for a walk.
2. Stop at intervals along the way; have children close eyes and listen for 30 seconds and then describe a sound they heard.
3. Write down the way each kid described his sound.
4. Try to stop in different places so there will be a variety of sounds to be heard.
5. See how many different sounds your group can discover.
6. Ask: Which sound did you like best? Why? Does it remind you of something else? Which sound is the loudest? The quietest? The highest? The lowest?

B. Mini-Forest — (10-15 minutes)

1. Lie on the grass face down.
2. Use our arms to encircle a patch of grass.
3. Find a least five different plants inside that circle made with your arms.
4. See if you can find any tiny animals crawling through the grass.
5. What else do you see? (Any dead leaves or twigs?)
6. Spread the grass apart and describe what you see.

Big Idea: Many plants and animals live together in a community.

C. Sketching Trees (15-20 minutes)

Find 2 trees with different shapes. Observe and sketch one tree at a time.

1. Look at the tree from a distance.

2. With your finger, trace in the air the shape of the tree. Do this from the ground up to top and from top down to ground.
3. Describe the shape of the tree.
4. Make a "telescope" with your hands. Look through this "telescope" at your tree from a distance.
5. Describe how the branches go out from the trunk — up? out? down?
6. Hold out your arms to show how the branches grow out from the tree trunk.
7. Go closer to the tree. What else do you notice about it?
8. Get close to the trunk of the tree and look up. What do you see?
9. Go to a comfortable place where you can see your tree. Sketch it with the crayon you brought.
10. Repeat procedure for second tree.
11. Add some of nature's color to your sketch.

Pick some grass. Use it as a crayon. Rub it around the paper to show where the green is on the tree.

Pick a yellow dandelion blossom. Use it as a crayon somewhere on your sketch.



D. "Touch and Feel" Hike (10-15 minutes). Take children for a walk. Give the following directions at intervals along the walk:

1. Find the *hairiest* leaf around. Bring back a tiny bit of it. Compare with other group members.
2. Find the *softest* leaf.
3. Find the *smoothest* rock.
4. Find the *roughest* twig.
5. Find something *cool*.
6. Find something *warm*.
7. Find something *bumpy*.
8. Find something *dry*.

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GONE BUT NOT FORGOTTEN

By Donna Howe, Head Teacher
Child Development Laboratories
Family & Child Sciences
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Dinosaurs seem to be everywhere these days! You can find them on shower curtains, wrapping paper, and placemats. You can even eat them for breakfast, lunch, or snacks. The current commercial popularity of dinosaurs merely reflects what children have known for years — dinosaurs are fascinating! Since children are so intrigued by these long-extinct creatures, they usually enjoy the opportunity to learn more. If you are planning to develop a dinosaur theme you must first do some research. If you fail to prepare yourself, you may find that the children know more than you do! Start with: *A First Look at Dinosaurs* by Millicent Selsam and Joyce Hunt, 1982, Scholastic Inc.

MATERIALS

Commercial dinosaur materials are available from many sources. Some of these are designed to depict factual characteristics, and some of them are misleading! Before you purchase materials, read some accurately illustrated books and learn something about the appearance and relative size of some of the better known dinosaurs. A little knowledge can help you to select items that will support your teaching rather than create confusion through misrepresentation.

Figures

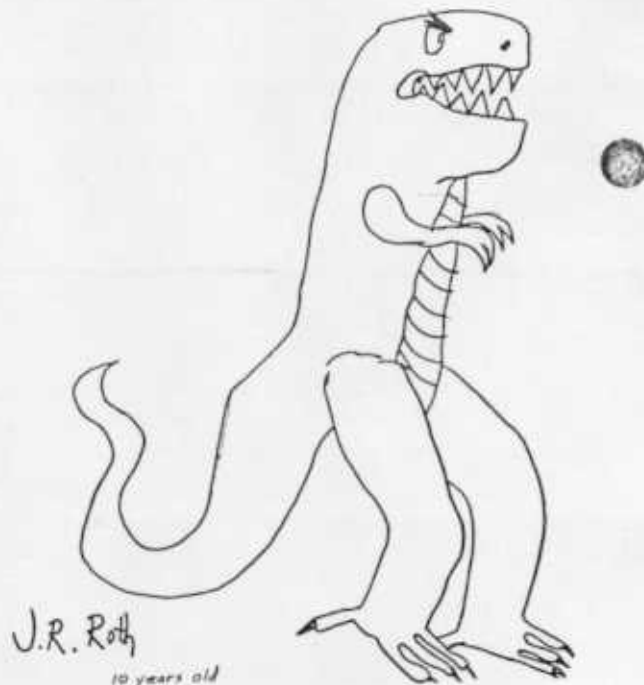
Since children cannot see a real dinosaur, some figures to see, touch, move and contemplate are a must. These can be used for sand play, with playdough, as table toys, with blocks, and for sorting, counting, and classification. The best sources for authentic figures are museum gift shops and school supply stores as well as some of the catalog dealers. You'll still need to be selective, but you should be able to find realistic models at these places. Avoid overly ferocious creatures and those with "cave man buddies." Before introducing these to the children, be sure that you can identify each one of these yourself!

Picture Books

You'll also want to have available some books with accurate illustrations and information. Many are available with fairly simple text and marvelous drawings. Avoid story books that have people with dinosaurs in modern settings until you are sure that the children are able to understand the incongruity of this.

Puzzles

A few dinosaur puzzles make a wonderful addition to this theme. The wide variety currently available includes floor puzzles and puzzles with skeletons pictured under the puzzle pieces. Choose a few and use them often — not just during Dinosaur Week!



ACTIVITIES

A paleontological dig can be simulated with "fossils" buried in sand for young adventurers to uncover. Providing digging tools, sieves, small brushes, and magnifying glasses to use in finding, cleaning, and examining discoveries. "Fossils" can be real (purchased inexpensively at a rock and gem show if you have no local sources) or made of playdough, cornstarch clay, etc. A few well-cleaned chicken or turkey bones add to the fun. Older children enjoy having the sand table or outdoor dig area divided into sections with string so that finds can be recorded or grouped for study. Children can create their own fossils, too.

Plaster of Paris casts can be made of small dinosaur figures, shells or real fossils. Start with a lump of modeling clay, smooth it out and make an impression by pressing your chosen object firmly into the clay. Lift the object carefully and brush the impression lightly with cooking oil. Mix plaster as directed on the package and pour into the impressions. Allow to set until firm and then gently remove the clay. Hint: give each child a plastic lid from a coffee can to hold clay and plaster and always mix plaster in disposable containers using disposable stirrers!

Cornstarch clay hardens into a sparkling and very satisfactory fossil. It can be molded into bone shapes or flattened and imprinted with a shell or a stick-drawn leaf. This clay is made with $\frac{1}{2}$ cup cornstarch, 1 cup salt and $\frac{1}{4}$ cup water. Stir well and cook over moderate heat until the consistency of mashed potatoes. Cool and store briefly in an airtight container. Creations will air-dry in a few days.

Playdough can also be used to create permanent fossils. Children enjoy mixing the flour (1 cup), salt ($\frac{1}{2}$ cup) and water (about $\frac{1}{3}$ cup) to use for this project. Figures may be air-dried or baked in a 225

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degree oven. Baking can take from 20 minutes to two hours depending on the size of the objects. Turn them over after 10 minutes to an hour. Work and bake on foil.

Soap "eggs" can be molded around small, inexpensive dinosaur figures. Whip soap flakes (such as Ivory Snow) with a small amount of water until smooth and fluffy. Give each child a large blob to mold around a dinosaur. After these dry they can be used for handwashing until the dinosaur appears. Note: Chilling whipped soap mixture seems to reduce stickiness. Be sure hands are clean.

Construct dinosaurs from available art materials. Since no one ever saw a living dinosaur, children can be as imaginative as they please and create as-yet-undiscovered creatures such as: Boxosaurus. Boxes, tubes, cardboard scraps, egg carton pieces, glue and tape can be used to create large or small creatures. Paints, collage materials, paper can be added for decoration if desired. Pipe-cleanersaurus. Bend and twist. Foamosaurus. Toothpicks can be used to connect pieces of styrofoam.

Make dinosaur skeletons using toothpicks, cotton swabs, and coffee stirrers to glue "skeletons" on dinosaur shaped paper.

Measure dinosaurs using lengths of string or yarn to compare small *Saltopusuchus* to a giant *Sauropod*. Decide which of them would fit in your home and if

you would really want it there!

Make dinosaur hats using stiff paper to serve as a tracing guide. Place on a double thickness of construction paper, trace around it, cut out, staple together and wear. This, too, can be decorated as children choose. Do fasten the double paper together with paper clips or staples to avoid slipping while cutting.

Sing about dinosaurs to the tune of *Ten Little Indians*:

*One big, two big, three big dinosaurs
Four big, five big, six big dinosaurs,
Seven big, eight big, nine big dinosaurs,
Ten big dinosaurs!*

*They all lived a long, long time ago.
They all lived a long, long time ago.
They all lived a long, long time ago.
Now there are no more!*

Other adjectives can be substituted for big to describe a variety of dinosaurs.

Throughout your dinosaur unit, take advantage of opportunities to discuss dinosaurs, ideas children have about what happened to them, and to speculate about what it would be like to have dinosaurs around today. You'll be amazed and delighted with the creativity and thought that children display. Enjoy!

RESOURCES: SCIENCE

Alexander, Alison and Susie Bower, *Science Magic: Science Experiments for Young Children*. Prentice Hall, 1986.

Althouse, Rosemary and Main Jr., Cecil. *Science Experiences for Young Children*. Teachers College Press.

Carmichael, Viola S., *Science Experiences for Young Children*. Los Angeles, California: Southern California Association for the Education of Young Children, 1969.

Harlan, Jean Durgin, *Science Experiences for the Early Childhood Years*. Charles E. Merrill Publishing Co.

Hatchett, Clint. *The Glow in the Dark Night Sky Book*. Random House. Ages 8-12.

Haupt, Dorothy, *Science Experiences for Nursery School Children*. Washington, D.C.: NAEYC.

Holt, Bess-Gene, *Science With Young Children*. National Association for the Education of Young Children.

Records and Tapes

Batchelor, Diane, *Where Are the Dinosaurs?* The Learning Line (album of cassette).

Batchelor, Diane, *Doing the Dinosaur Rock* The Learning Line (album or cassette).

AROUND THE YARD ACTIVITIES . . .

(Continued from page 5)

E. "Color" Hike

1. Look for things that are different colors of green. Bring back three or four green things.
2. Arrange them in your hand from lightest to darkest green.
3. Find and describe things that are yellow, pink, brown, grey.

F. Math Measurement

Have the child determine the length of his step. Use this unit of measurement for the following activities:

1. Find out how many steps it is from one end of your yard to the other.
2. Calculate perimeters and areas of school yard activity spaces (playfield, ball diamonds, open fields, etc.). Convert measurement to yards, meters.
3. Construct a conversion scale for metric measurements using the length of your step.
4. Find out how many times you need to run around the playfield to run a mile.

PROVIDER'S CORNER



ADVANTAGES OF OWNING A DAY CARE HOME

*By Joy Schaberg
Family Day Care Home Provider
Ingham County*

In my experience of owning a day care home, the learning environment has a positive effect on children's behavior. Children feel relaxed in a peaceful home setting. Undesirable behavior situations are less frequent and are easier to handle in calm surroundings and with a smaller group. With extra time to solve problems that arise and with a small group, discipline has been more positive.

A home atmosphere and smaller numbers of children can increase positive learning experiences; provide more time to teach creatively; and make it easier to become involved and get to know the children.

Children are not the only ones who benefit. Advantages for an owner of a day care home include being available for family needs and emergencies; saving gas

on travel to and from an outside workplace; being in control of your own schedule; and a wonderful freedom that adds freshness and crispness to creativity.

You are your own boss. Creativity and freedom reign!!!

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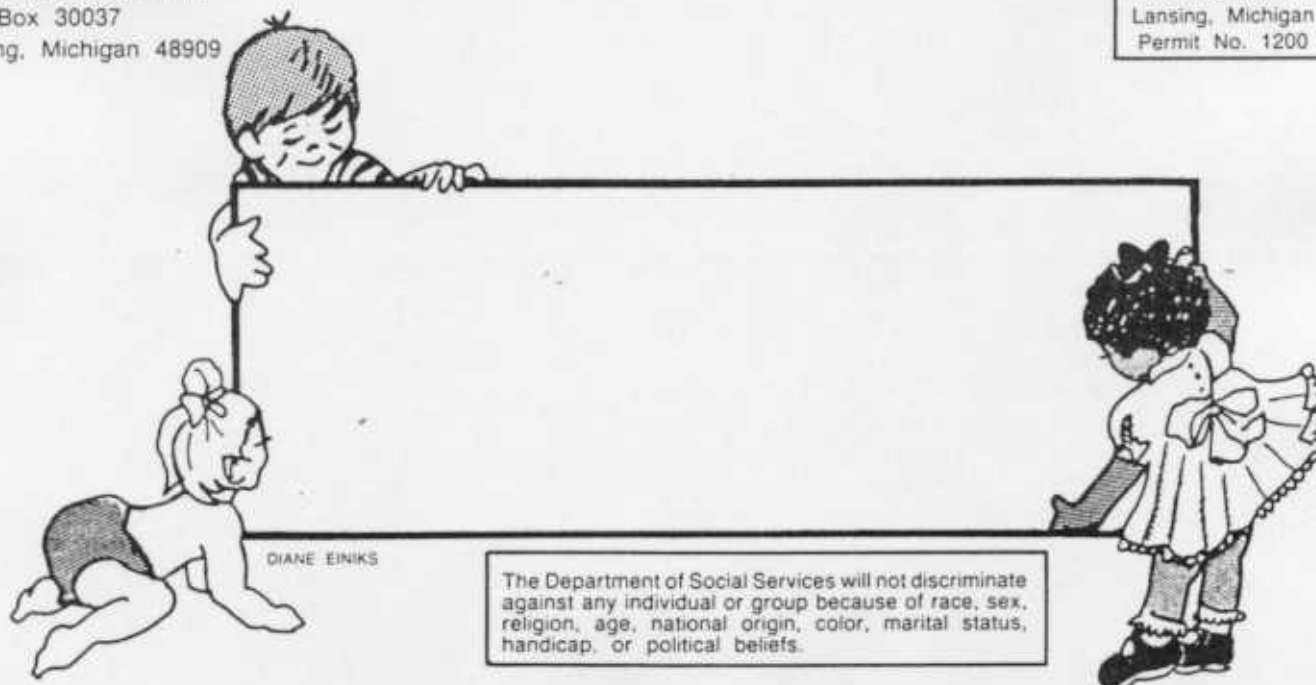
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